

Ethernet Powerline Adaptor

User Manual

Single Pack or Twin Pack

FCC Radiation Norm

This equipment has been tested and found to comply with limits for a Class B digital device pursuant to 47 CFR, Part 2 and Part 15 of the Federal Communication Commission (FCC) rules. Operation is subject to the following Two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received including interferences that may cause undesired operations.

CE Radiation Norm

This equipment has been tested and found to comply with the limits of the European Council Directive 89/336/EEC on the approximation of the law of the member states relating to EN 55022:1998/A1:2000/A2:2003 Class B, EN61000-3-2:2000, EN 61000-3-3:1995/A1:2001, EN 55024:1998/A1:2001/A2:2003 and EN 60950-1.



Important Safety Instructions

1. Do Not open this product or attempt to service this product, it may expose you to dangerous high voltage and other risks.
2. Do Not operate this product near water.
3. Do Not place or operate near or over radiator or heat register.
4. Do Not expose this product to dampness, dust or corrosive liquids.
5. Do Not connect this product and Disconnect from wall socket during a lightning or thunderstorm
6. Do Not obstruct this product ventilation slots, as insufficient airflow may harm this product.
7. Do Not put anything on this product.
8. Plug directly into wall socket (100Vac~240Vac). Do Not use an extension cord between this product and the AC power source.
9. When plugging this product into wall socket, make sure that electrical socket are not damaged, and no leakage for gas or water pipes to begin with.
10. Place the connecting cables carefully so people won't stumble or walk on it.
11. The Powerline Adaptor should be operated from the type of power indicated on the marking label. If you are not sure of the type of power available, consult the qualified technician.
12. Unplug the Powerline Adaptor from the mains and refer the product to qualified service personnel for the following conditions:
 - If liquid has been spilled on the product
 - If the product has been exposed to rain or water
13. Unplug from the wall socket before cleaning. Use a damp cloth for cleaning. Do not use liquid cleaners or aerosol cleaners



This symbol on the product or in the instructions means that your electrical and electronic equipment should be disposed at the end of its life separately from your household waste. There are separate collection systems for recycling in the EU

For more information, please contact the local authority or your retailer where you purchased the product.

CAUTION!

The Federal Communication Commission warns the user that changes or modifications to the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Chapter 1 Introduction	1
1.1 Features	2
1.2 Packet Contents	3
Chapter 2 Connecting Mechanism.....	4
2.1 Introduction	4
2.1 LED Indicator.....	5
2.2 Physical Interface	6
2.3 Hardware Connection – Computer.....	7
2.4 Hardware Connection – Internet	8
Chapter 3 Installing Management Utility.....	9
Chapter 4 Using The Management Utility	13
4.1 Main	14
4.1.1 Rename	16
4.1.2 Enter Password.....	17
4.1.3 Add Device.....	18
4.2 QOS.....	20
4.3 Privacy.....	22
4.4 Diagnostics	24
4.5 About.....	26
Advance Feature: How to Use the Push buttons.....	27
Pair(Secure with 128 bits-AES).....	27
Set Up a Powerline AV Network with the Pair button.....	27
Pair Button Behavior.....	28
Reset.....	28
Appendix A: Troubleshooting Guide	29
Copyright.....	30

Chapter 1 Introduction

Congratulations on your purchase of this outstanding Ethernet Powerline Adaptor. This device is a 200Mbps Powerline Ethernet Adaptor which transforms your house's existing electrical wiring into an ubiquitous networking infrastructure. Simply plug this 200Mbps Ethernet Powerline Adaptor into an ordinary AC power outlet which will easily extend your Cable/xDSL broadband connection or existing Ethernet (LAN) network to any other electrical outlet in any room of a house without the need of any new cabling.

This Ethernet Powerline Adaptor supports up to 200Mbps data rate over the existing household power circuit. With data rates of 200Mbps, full multimedia application can easily be supported throughout the whole house in addition to Internet access. This Ethernet Powerline Adaptor uses the existing power lines installed in a home as a path to transmit digital data, voice, audio and video between devices.

To ensure data communication's security and multimedia applications, this Ethernet Powerline Adaptor support built-in 128-bit AES encryption and Quality of Service (QOS)features.

With minimum setup, you can install and use this Ethernet Powerline Adaptor within minutes. The adaptor add two new function to be useful

1. Existing connection with a new Unassociated device added via the **Pair** button.
2. Reset to default setting via the **Reset** button.

1.1 Features

■ Homeplug AV

- High speed data transfer rate up to 200Mbps
- HomePlug AV standard compliant
- Works with AC input of 100V ~ 240V
- Plug-and-Play (PnP) configuration
- High-speed Powerline adapter with Ethernet interface
- Low power consumption
- OFDM techniques for high data reliability in noisy media conditions
- Intelligent channel adaptation maximizes throughput under harsh channel conditions
- Build-in QoS and Error Correction feature
- 128-bit AES Link Encryption with key management for secure power-line communications
- Transmission range up to 200m over household power supply grid
- Support two Push Button “Pair” and “Reset”
- RoHS (Lead-Free) compliant

■ System Requirement

- At least two AC 100V ~ 240V power outlets with standard home power wiring
- A computer with the following:
 - Operating System with TCP/IP installed
 - Pentium III compatible processor and above
 - Ethernet LAN card installed with TCP/IP protocol
 - 64 MB RAM or more
 - 50 MB of free disk space (Minimum)
 - CD-ROM Drive

■ Target Application

- Standard Video TV (SDTV) Distribution
- Higher data rate broadband sharing
- Shared broadband Internet access
- Audio and video streaming and transfer
- Expanding the coverage of wireless LANs
- Voice Over Internet Protocol (VoIP)
- PC file and application sharing
- Printer and peripheral sharing
- Network and online gaming
- Security cameras

1.2 Packet Contents

The 200Mbps Ethernet Powerline Adaptor package contains the following items:

- One Ethernet Powerline Adaptor or Two for Twin pack
- One CAT-5 Ethernet (LAN) Cable or Two for Twin pack
- One Quick Start Guide
- One CD-ROM (Utility / Manual / Quick Setup Guide/Acrobat Reader)

If any of the above items are damaged or missing, please contact your dealer immediately.

Chapter 2 Connecting Mechanism

2.1 Introduction

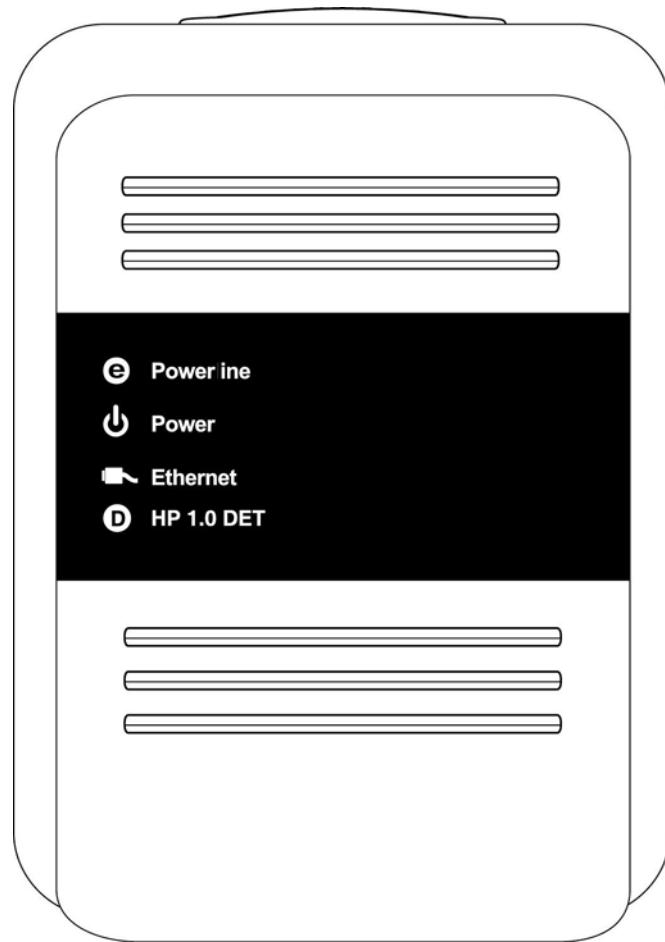
The Ethernet Powerline Adaptor support up to 200Mbps data rate. With this high speed connection rate, this Ethernet Powerline Adaptor allows you to setup a high speed home network by using your home existing electrical wiring. Simply plug this Ethernet Powerline Adaptor into an ordinary power outlet to extend your Cable/xDSL broadband connection or existing LAN network to any other electrical outlet in any rooms of your house.

Take notes that this Ethernet Powerline Adaptor works in pairs. You need to plug one Ethernet Powerline Adaptor into a power outlet for each computer (Connect to the computer LAN card) you want to connect (Network access); you will also need another Ethernet Powerline Adaptor connected to your Cable/xDSL broadband (Ethernet port) in order to extend your broadband connection or Internet surfing.

Section below describe the Ethernet Powerline Adaptor's LED indicators, physical interface and hardware connection mechanism.

2.1 LED Indicator

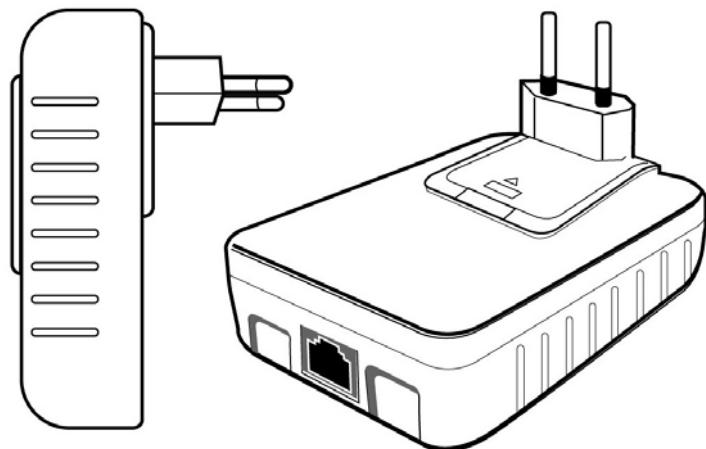
The LED indicator displays information about the device's status.



Label	Status	Description
Powerline	ON	Another powerline port is detected on the same powerline network
	OFF	Did not detect any other powerline port on the same powerline network
	Flashing	The powerline port is transmitting/receiving data
Power	ON	The Ethernet Powerline Adaptor is power on
	OFF	The Ethernet Powerline Adaptor is not receiving power
Ethernet	ON	The Ethernet port is on and ready to receiving/transmitting data
	OFF	The Ethernet port is not connected or not power on
	Flashing	The Ethernet port is receiving/transmitting data
HP 1.0 DET	OFF	Did not detect any HomePlug 1.0 device on the same powerline network
	Flashing	Another HomePlug 1.0 device is detected on the same powerline network

2.2 Physical Interface

There are two physical interface on this Ethernet Powerline Adaptor.



Interface	Description
Ethernet	One 10/100Mbps Ethernet port connected to PC LAN card or broadband device.
Power Plug	Power Plug connected to any 100V ~ 240V AC power socket.

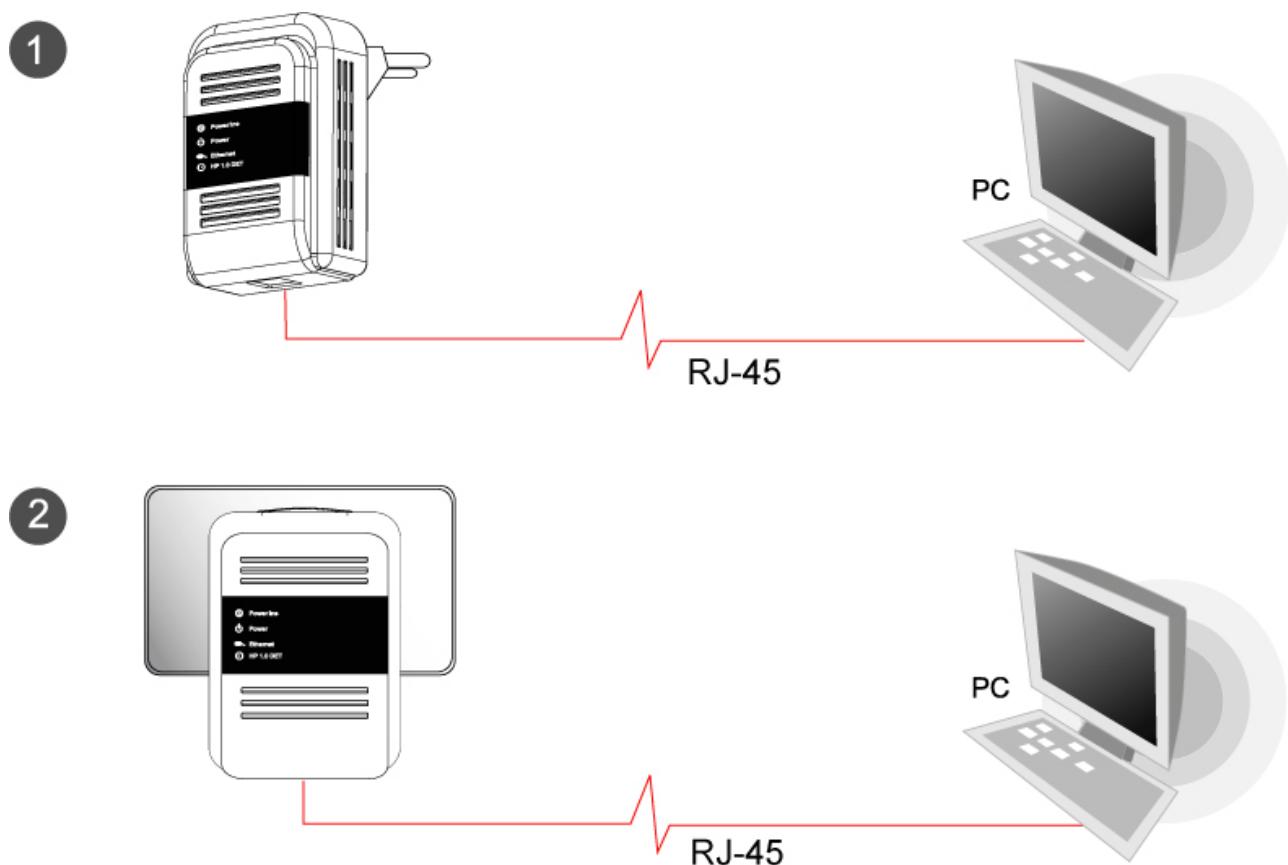
2.3 Hardware Connection – Computer

For those computers you wish to be networked by Ethernet Powerline Adaptor, each of the computer must be properly connected with an Ethernet Powerline Adaptor through an Ethernet (RJ-45) cable.

Following are the steps to properly connect the Ethernet Powerline Adaptor to your computer:

1. Power off your PC or Notebook.
2. Connect the provided Ethernet (RJ-45) cable to the Ethernet Powerline Adaptor's Ethernet port.
3. Connect the other end of the Ethernet (RJ-45) cable to your computer's LAN port.
4. Plug the Ethernet Powerline Adaptor into a wall socket next to the computer.
5. Turn on your computer.
6. Check and confirm that the **Power** and **Ethernet** LEDs on the Ethernet Powerline Adaptor are **ON**.

The hardware connection mechanism is shown below:

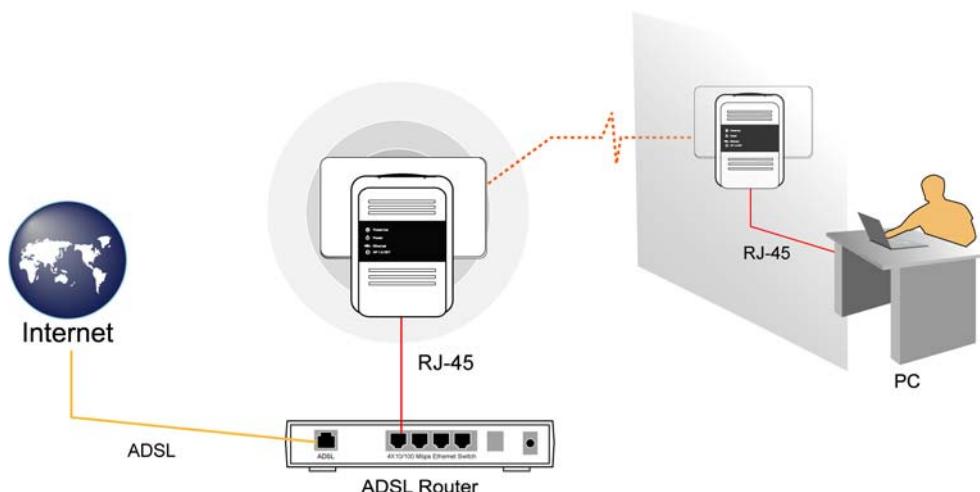


2.4 Hardware Connection – Internet

This section describe how to connect the Ethernet Powerline Adaptor into your existing ADSL broadband connection via ADSL Ethernet port. Follow the procedures describe below to connect the Ethernet Powerline Adaptor to your ADSL broadband connection:

1. Power off your PC or Notebook.
2. Connect the provided Ethernet (RJ-45) cable to the Ethernet Powerline Adaptor's Ethernet port.
3. Connect the other end of the Ethernet (RJ-45) cable to an available Ethernet port of your ADSL broadband Router.
4. Plug the Ethernet Powerline Adaptor into a wall socket next to the computer.
5. Turn on your computer.
6. Check and confirm that the **Power**, **Powerline** and **Ethernet** LEDs on the Ethernet Powerline Adaptor are **ON**.

The hardware connection mechanism is shown below:



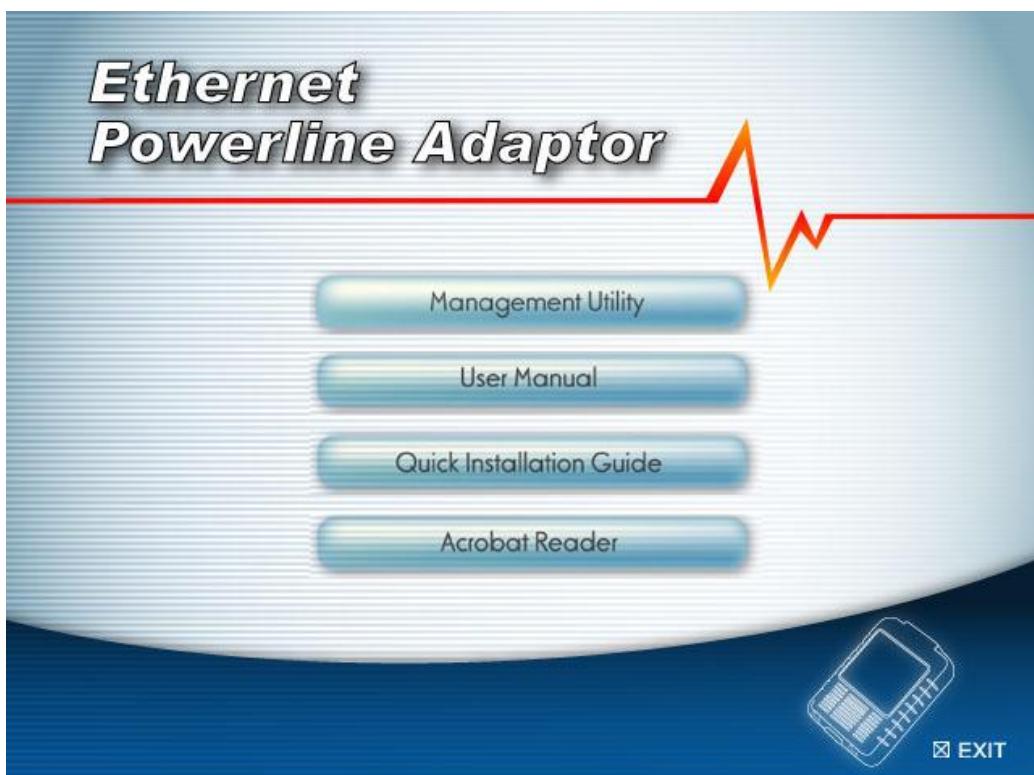
Remark: Do not connect the Powerline adaptor to a extention lead, power strip,extension cord, surge protector as this may degrade the network performance.

Chapter 3 Installing Management Utility

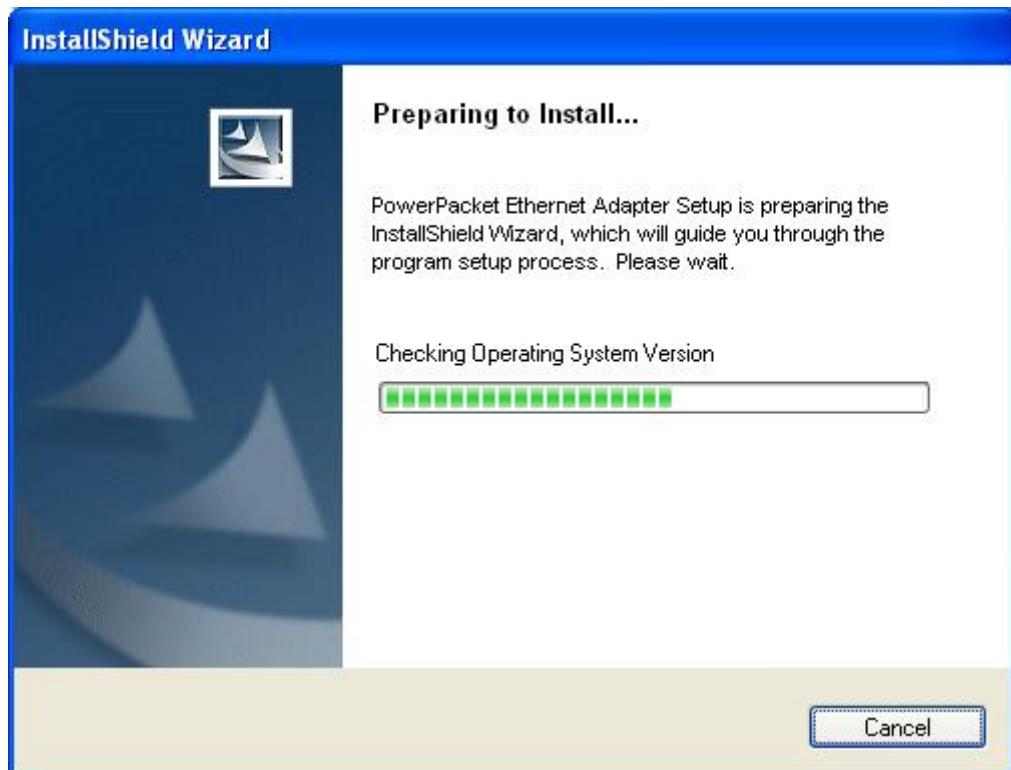
Please verify that no other Ethernet Powerline Adaptor or any Encryption Management Utilities are installed before installing the provided software. If other Powerline Utilities are installed, uninstall them and restart your personal computer before installing this provided software.

Follow the following procedures to properly installing the provided Management Utility:

Step 1: Power on your computer and insert the provided CD into the CD-ROM drive, the following screen will pop-up automatically. Click on “**Management Utility**” to install the Management Utility.

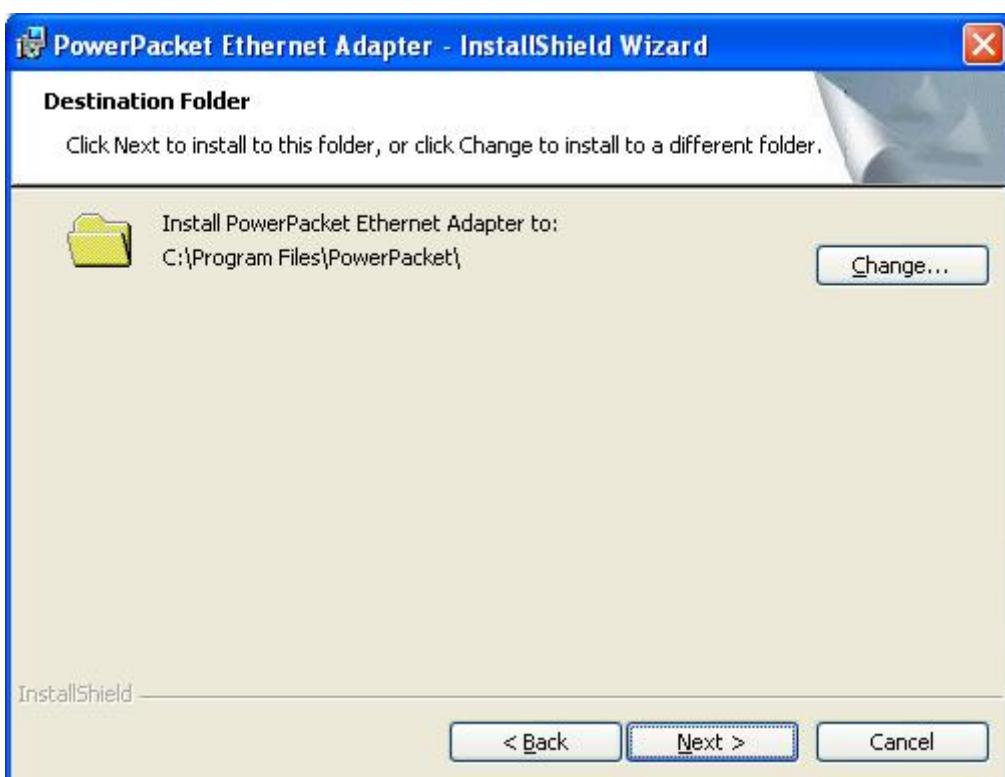
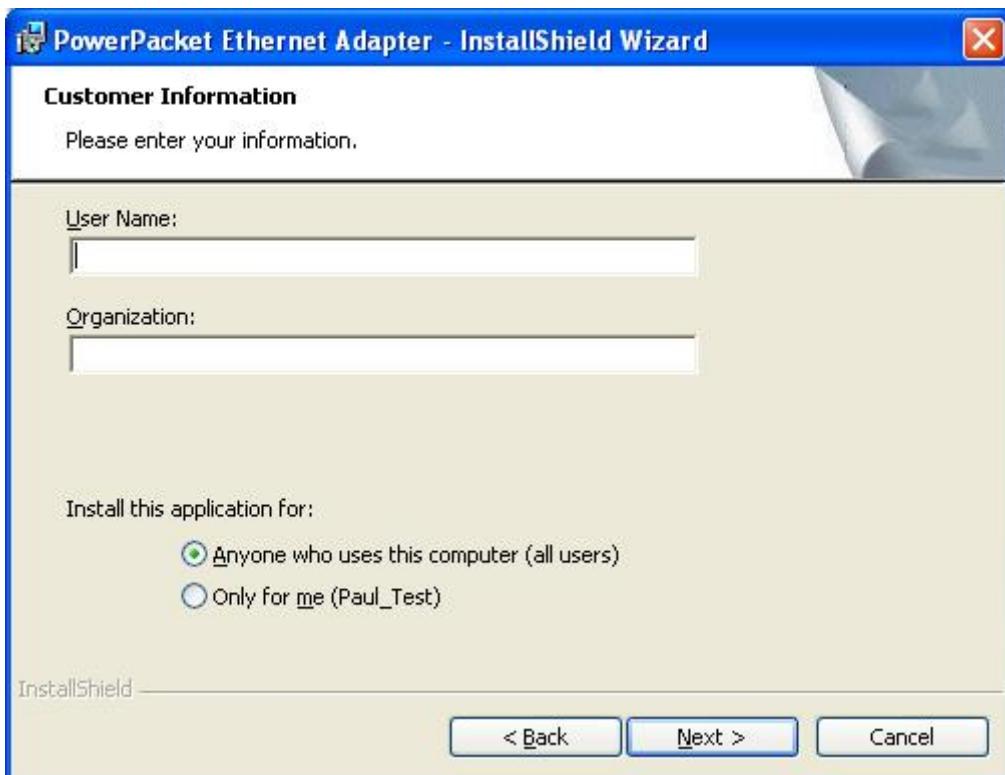


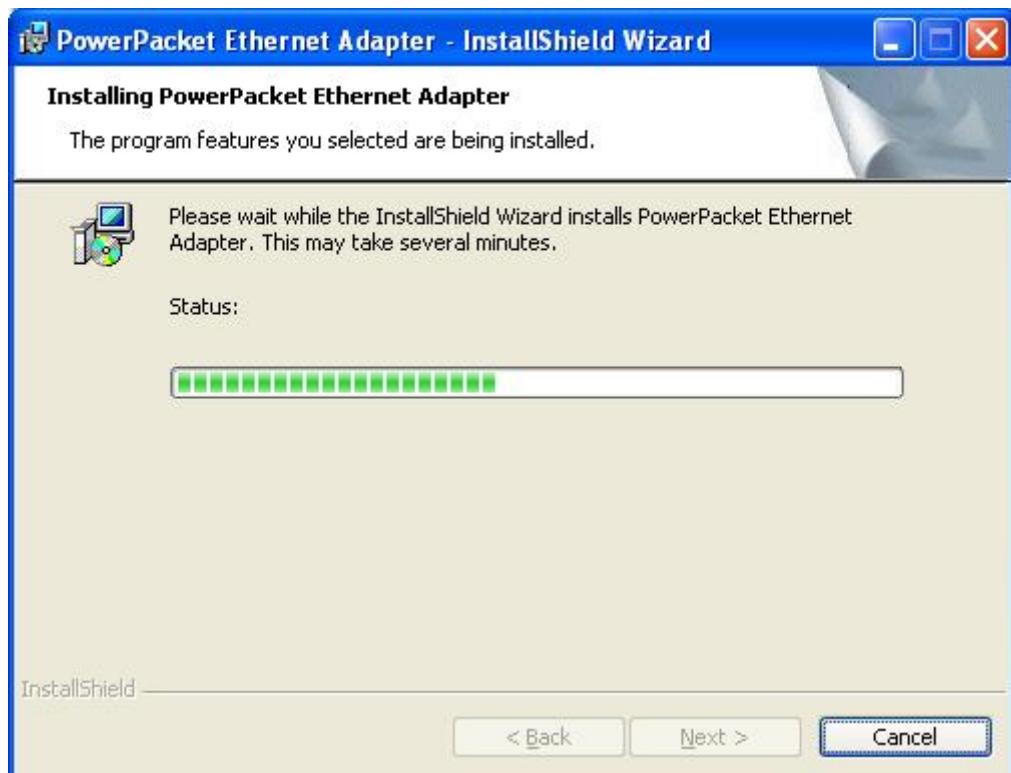
Step 2: The program installation process will carry out and copy all the necessary files to your system.



Cancel







Step 3: After the installation, a shortcut to the "Power Packet Utility" application icon is provided on the windows desktop.

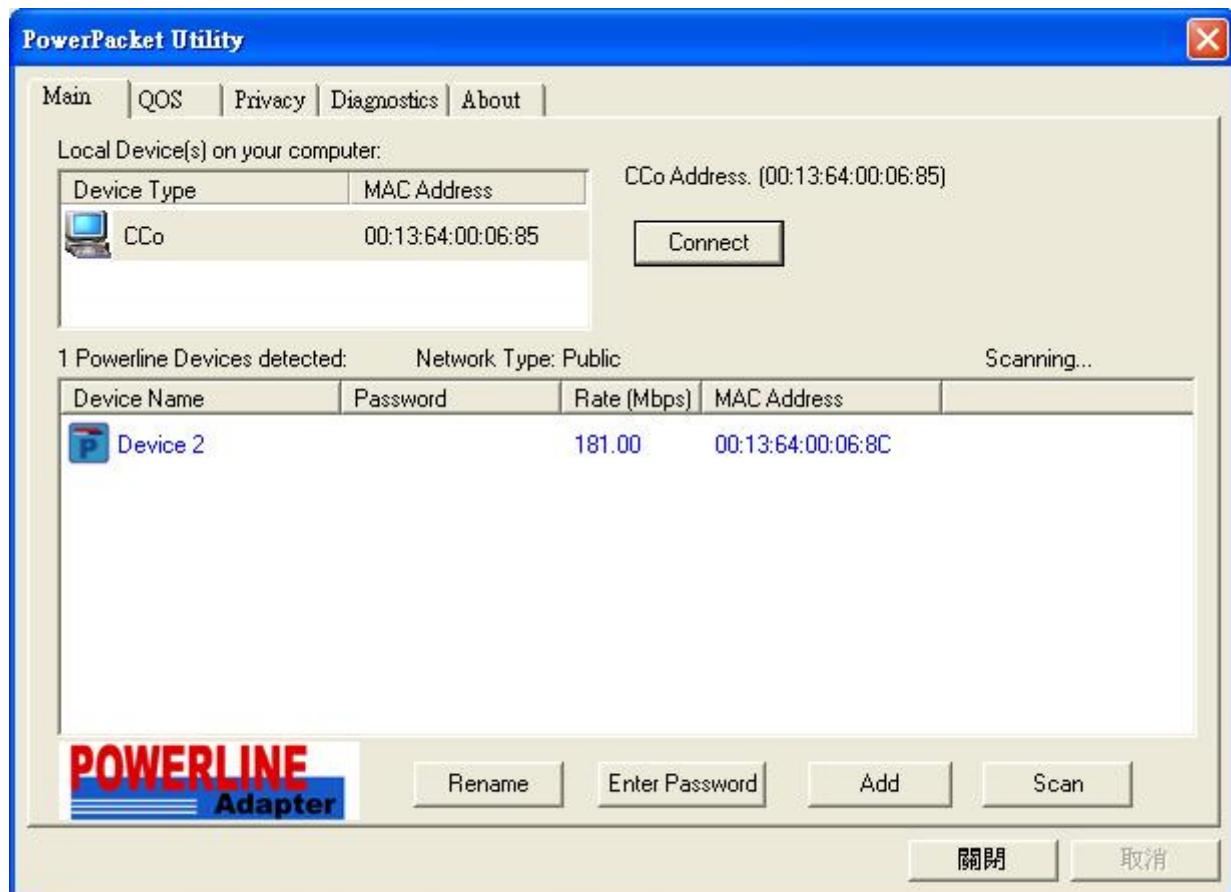


Chapter 4 Using The Management Utility

After you'd successfully installed the Ethernet Powerline Adaptor hardware and Management Utility software, you can setup or configure the devices according to your need.

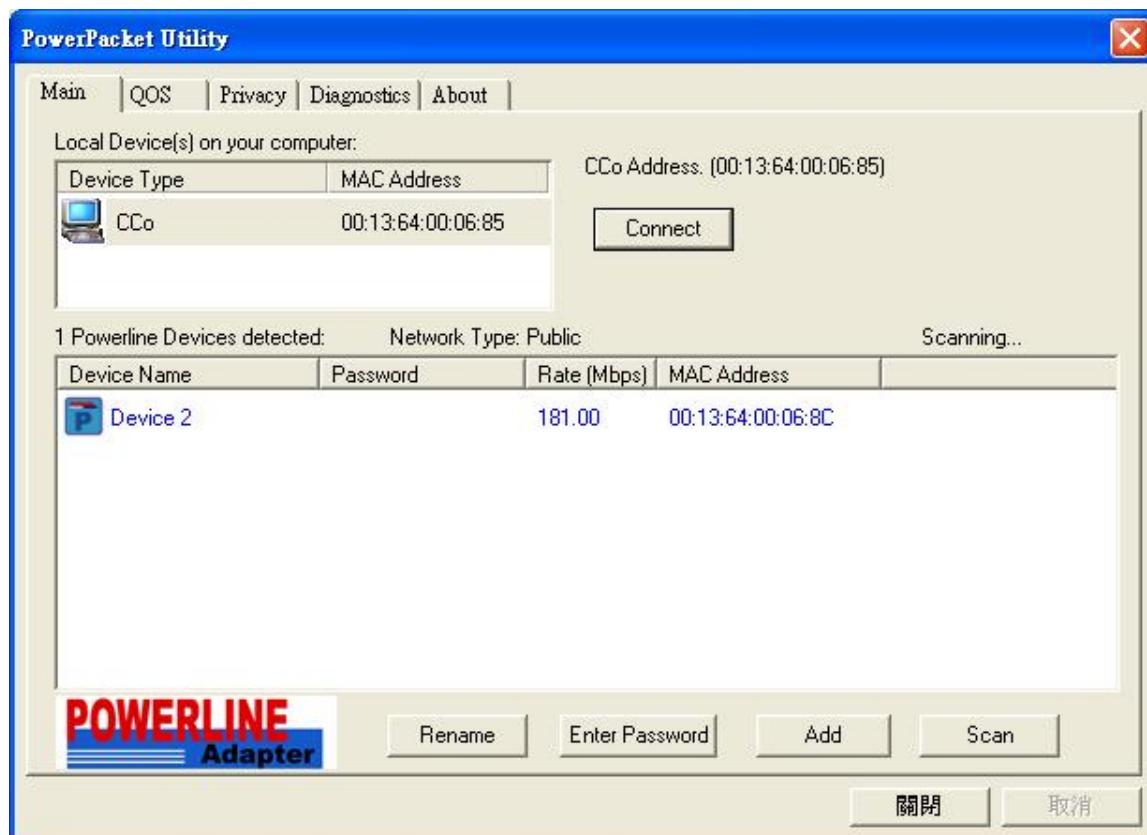
This Ethernet Powerline Adaptor Configuration Utility enables the users to identify powerline devices on the powerline network, measures data rate performance, ensures privacy and performs diagnostics by setting user defined secure powerline networks.

Double click on the “**Power Packet Utility**” from your windows desktop, the following screen display. This Management Utility consists of a set of five property sheets, viz., “**Main**”, “**QOS**”, “**Privacy**”, “**Diagnostics**” and “**About**”.



4.1 Main

The **Main** tab shows all the Ethernet Powerline Adaptor that are logically connected to the current computer where the Management Utility is running.

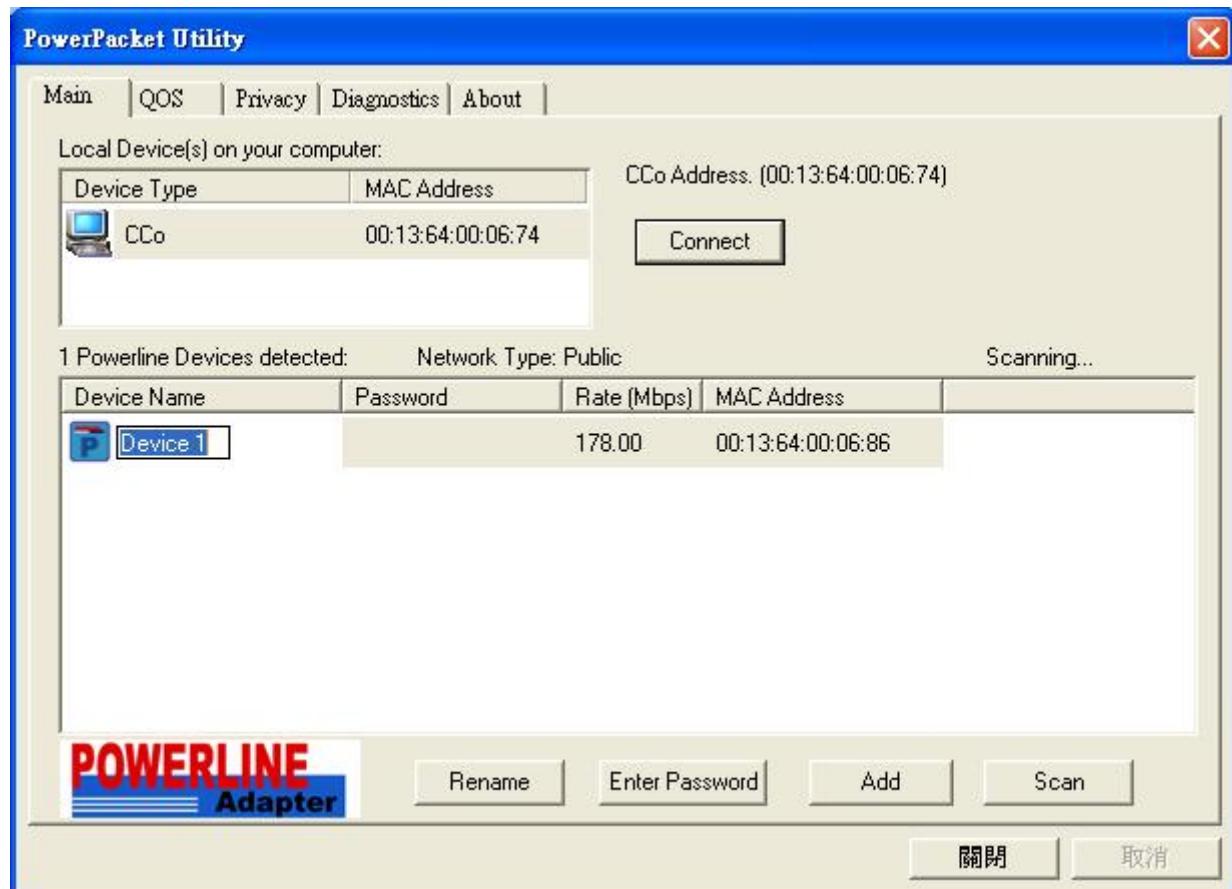


- Local Device(s) on your computer:** This shows all local Ethernet Powerline Adaptor found connected to the computer's LAN card. In most cases, only one device will display in this panel. Click and select the local device shown on the screen then click “**Connect**” tab to manage the Ethernet Powerline Adaptor. The status message will be shown above the “**Connect**” button indicates that your PC is connected to the same device. Once the chosen Ethernet Powerline Adaptor is properly connected, this Management Utility will automatically scan the power line periodically for any other existing powerline devices.
- “x” Powerline Devices detected:** This display all the Ethernet Powerline Adaptor found on the current logical network. “x” shows the number of remote Ethernet Powerline Adaptor discovered by this Management Utility.
- Network Type:** Displayed the type of logical network: “**Public**” or “**Private**”.

- Autoscan:** Shows the scanning status (Default is “**ON**”).
 - **Device Name:** Shows the default device name. One may redefine or change the name by clicking on the name and editing in place or by clicking the “**Rename**” button.
 - **Password:** Shows the current password of the Ethernet Powerline Adaptor.
 - **Quality:** Shows the quality of the Ethernet Powerline Adaptor connection.
 - **Rate (Mbps):** Shows the current transmission rate of the selected Ethernet Powerline Adaptor.
 - **MAC Address:** Shows the Ethernet Powerline Adaptor’s MAC address.
- Rename:** Click to change the name of the selected Ethernet Powerline Adaptor.
- Enter Password:** Shows the supplied Ethernet Powerline Adaptor’s password (Initially left blank). To set the Ethernet Powerline Adaptor password (Which is required when creating a private network), click and select the device shown in the lower panel and click on the “**Enter Password**” button. Follow the pop-up dialog box to complete your password setting.
- Add:** Click this button to add a remote Ethernet Powerline Adaptor to your network that is not on the lower panel displayed list. You will advice to locate the passwords for all Ethernet Powerline Adaptor you wish to manage and add them to the local logical network by clicking the “**Add**” button. Follow the pop-up dialog box to complete your setting.
- Scan:** Click the “**Scan**” button to perform an immediate search of the Ethernet Powerline Adaptor connected to the computer. The Management Utility will automatically perform the scanning process and update the display every few seconds by default.

4.1.1 Rename

This Management Utility allows you to change the name of the listed Ethernet Powerline Adaptor. Click and select the Ethernet Powerline Adaptor you wish to change from the list, then click on the “Rename” tab and editing-in-place to change the name.



4.1.2 Enter Password

To set or change your Ethernet Powerline Adaptor's password, click and select the Ethernet Powerline Adaptor you wish to change from the list, then click on the “**Enter Password**” tab, the following screen display.

Enter your **Password** (Take note to the password format) and click “**OK**” after setup.



Note: The Ethernet Powerline Adaptor device must be present on the power line (plugged in) in order for the password to be confirmed and added to the network. If the Ethernet Powerline Adaptor device could not be located, a warning message will be shown.

4.1.3 Add Device

The following dialog box pop-up when clicking the “**Add**” button under **Main** configuration homepage. The dialog box allows you to enter both the selected device’s name and password. Noted that the Ethernet Powerline Adaptor must be present on the power grid in order to activate the set password and added to the local network.

Enter your **Device Name** and **Password** (Take note to the password format) and click “**OK**” after setup.



The following screen display after the naming and password setting process, which is also the **Diagnostics** configuration homepage.

PowerPacket Utility

Main | QOS | Privacy | Diagnostics | About |

System Information

On NIC #1 MAC = 00:08:A1:0F:49:7E
HomePlugAV Device #1 MAC = 00:13:64:3C:9E:C9
Network name: HomePlugAV
Vendor: Intellon
Firmware: INT6000-MAC-1-4-1454-650-20070226-SP2-B

On NIC #2 MAC = 02:00:54:55:4E:01

Remote Device History (Log)

Device	MAC Address	Password	Rate (Mbps)	Network	Last Seen
Device 1	00:13:64:40:D8:40	- not entered -	153.00	HomePlug...	Jan 03 06:07

← →

Delete...

Email Report...

Save Report...

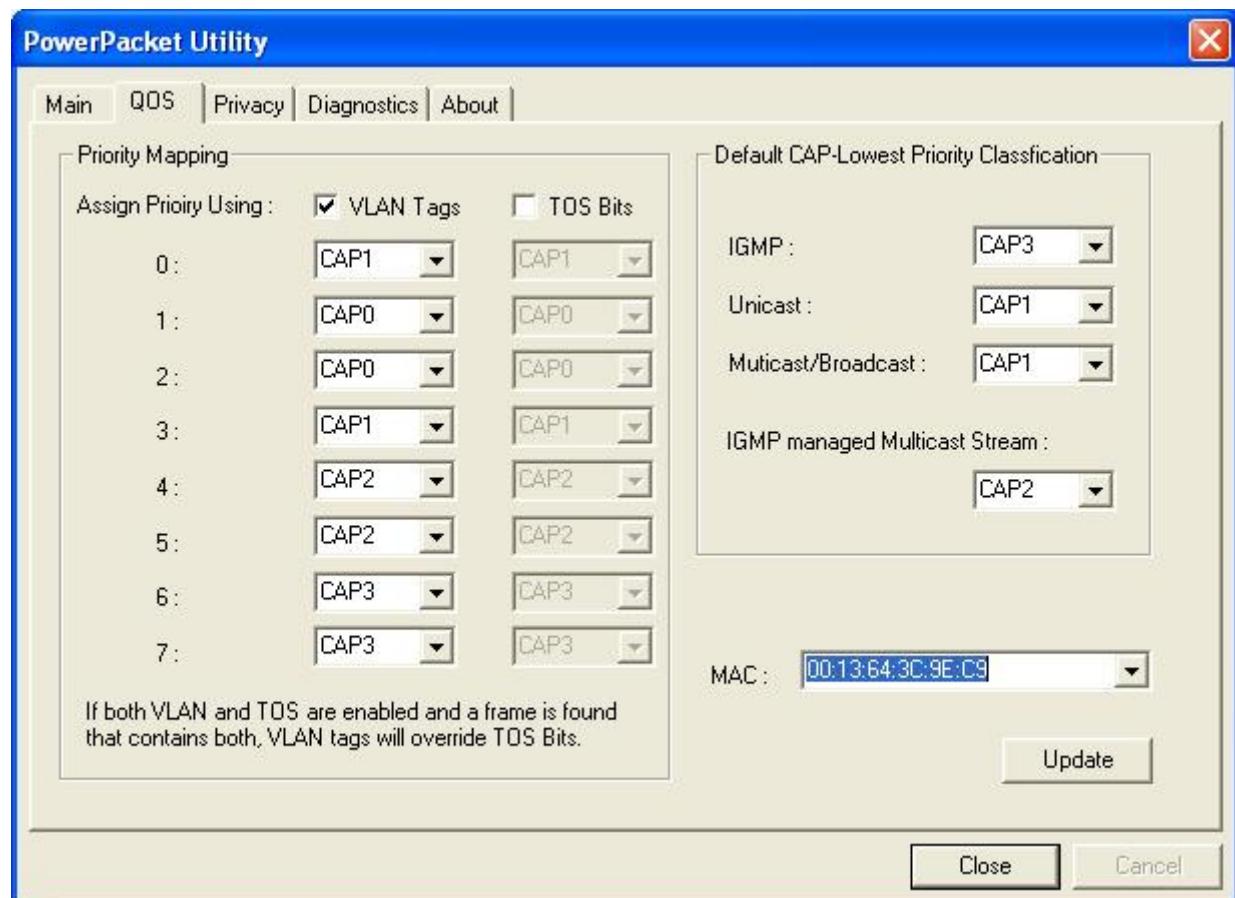
Print Report...

Close

Cancel

4.2 QoS

The second tabbed window, labeled 'QoS' for Quality of Service, is shown in Figure.



QoS requirements are different for various data types such as streaming video or music, voice and raw data. To provide higher QoS for streaming data, priority levels can be set using tags at the beginning of data frames. Virtual Local Area Network (Vlan) 802.1p priority tags on Ethernet frames are used to specify 8 (0~7) levels of 'user priority'. Powerline AV powerline allows for 4 levels of Channel Access Priority (CAP(0-3)). Therefore, the 8 levels of VLAN Ethernet tags must be mapped to the 4 levels of CAP priority, where CAP 3 is the highest priority and CAP 0 is the lowest. CAP 3 priority might be used for voice and network management frames, CAP 2 is used for streaming video-and must while CAP 1 can CAP 0 are used for data. Mapping VLAN tags or TOS bits to CAP levels is easily done using the VLAM Priority Mapping function on the QoS tab window.

The 'Priority Mapping' group contains both VLAN and TOS Bit mapping capability. When selected, packets matching the VLAN or TOS Bit priority will be assigned the Powerline contention priority (channel Access Priority, CAP) as set in the corresponding dropdown box. If a packet has both VLAN and TOS in it, VLAN will override TOS.

The 'Default CAP' group allows for default priority mapping of packets that do not have a VLAN or TOS bit (or if these are disabled). Setting are available for Unicast (directed to a host).

- IGMP - (default CAP 3) – sets the channel access priority for IGMP frames – these are the group management frames, not the stream data
- Unicast – (default CAP 1) – sets the default channel access priority for unicast frames not matching any other classification or mapping.
- IGMP managed Multicast Stream (Fixed to CAP 2) – sets the default channel access priority for stream data belonging to a snooped IGMP multicast group.
- Multicast/Broadcast – sets the default CAP for multicast frames not in a snooped group and for broadcast frames.

After making CAP settings, clicking the Write button will commit these, along with the values from the Configuration tab, to NVRAM on the connected device.

4.3 Privacy

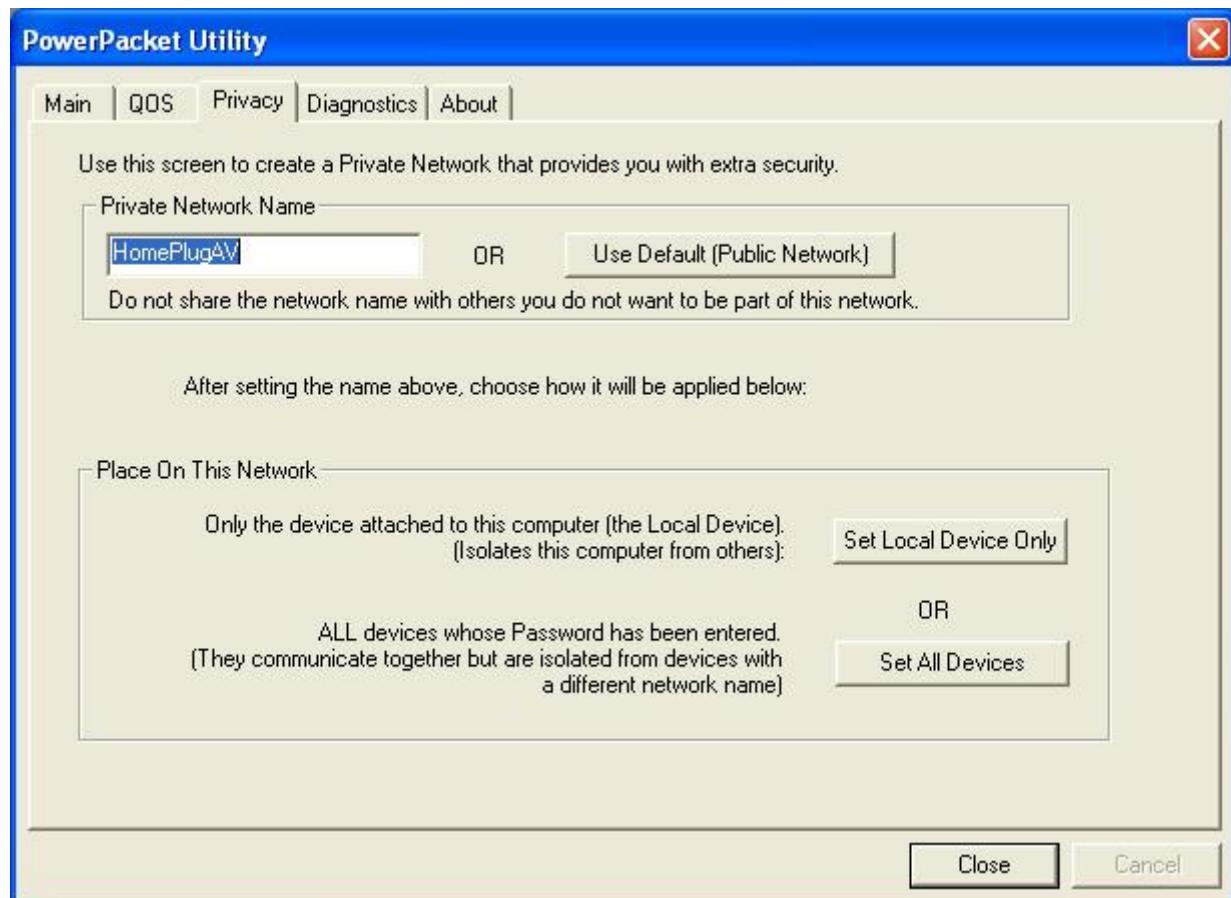
The **Privacy** configuration page provides a means for managing the local network and providing additional security for the logical network and also to select the devices that has to be included in the network. All Powerline devices are shipped using a default logical network (network name), which is normally “**HomePlug**”

The **Privacy** configuration homepage allows you to change the **Network Name** of the Ethernet Powerline Adaptor that is currently connected to this computer into a private network. Reset the private network to universal public network by clicking on the “**Use Default (Public Network)**” or entering/editing “**HomePlug**” under column of “**Private Network Name**” is always available.

Note that every Ethernet Powerline Adaptor on your home network **MUST** have the same **Network Password** for connectivity to be established throughout your home.

Note: Changing the network name to anything other than “**HomePlug**” will show the network type on the

Main configuration screen as “**Private**”.

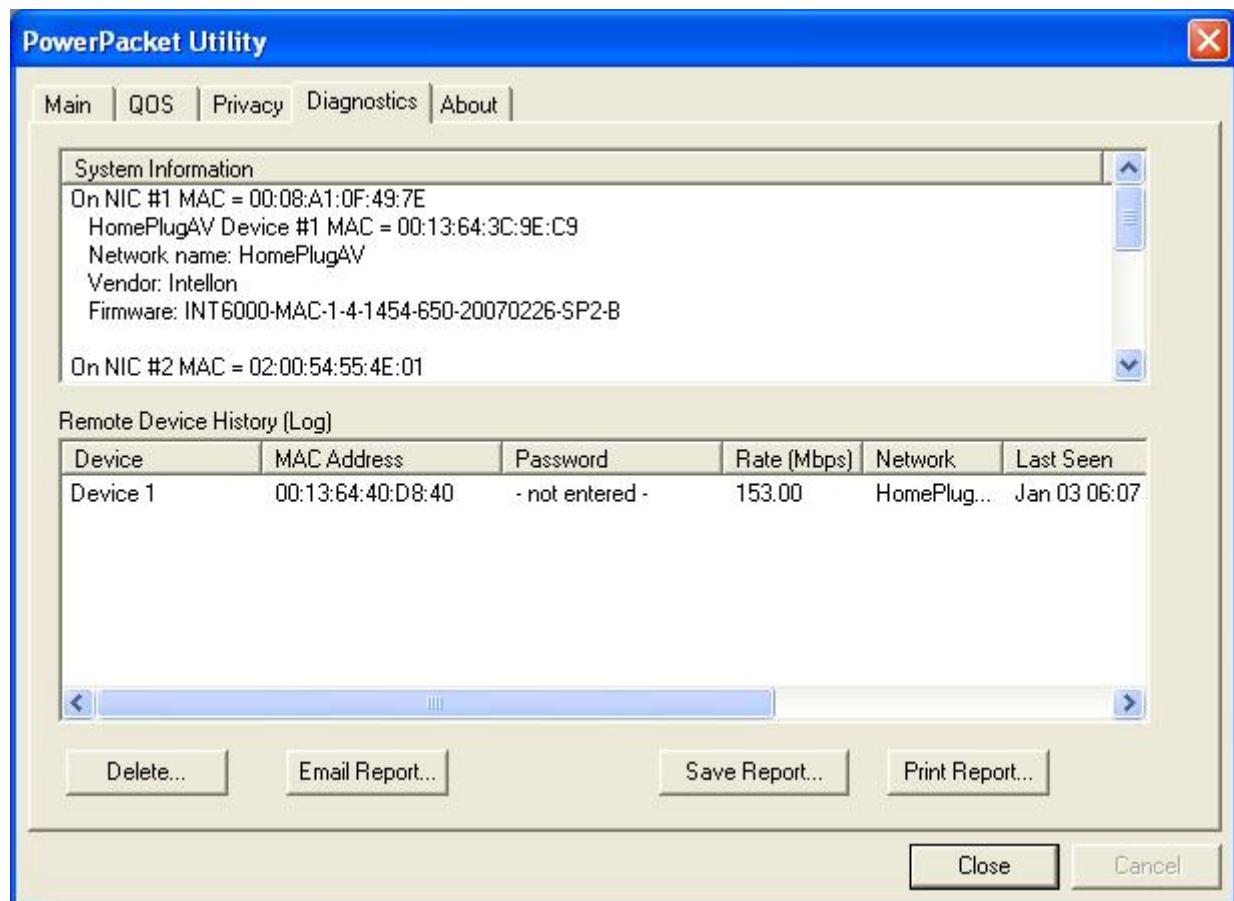


- Set Local Device Only:** Click this tab to change the network name of the local Ethernet Powerline Adaptor device only. All Ethernet Powerline Adaptor devices seen on the **Main** configuration homepage prior to this will be no longer present in the new network, effectively making the local devices not to communicate to the devices who were in the old logical network. Devices previously set up with the same logical network (same network name) will appear in the device list afterward selecting this option.

- Set All Devices:** The **Set All Devices** button is used to change the logical network of all devices that appear on the **Main** configuration homepage whose Device's Password had been entered for the same logical network. A dialog window will appear to report the success of this operation. For devices whose device password's were not entered, this operation will fail and will report a failure message.

4.4 Diagnostics

The **Diagnostics** homepage shows the **System Information** and **Remote Device History** of all remote devices seen over a period of time which are only readable. Click on the “**Diagnostics**” tab and the following screen display.



The **Diagnostics** information displayed can be saved to a text file. One can email the saved text file to the local supplier when there's technical support require or print the saved text file as reference during a technical support conference.

The **Upper Panel** shows technical data concerning software and hardware present on the host computer which were used to communicate over Ethernet Powerline Adaptor on the Powerline network. It may include the following:

- Operating System Platform/Version
- Host Network Name
- User Name
- MAC Address of all NICs (Network interface card) connected to the host
- Identify versions of all Driver DLLs and Libraries used (NDIS) and optionally
- MAC addresses of all devices connected locally to the host

Click the “**Delete**” tab when there's Ethernet Powerline Adaptor devices no longer part of the network.

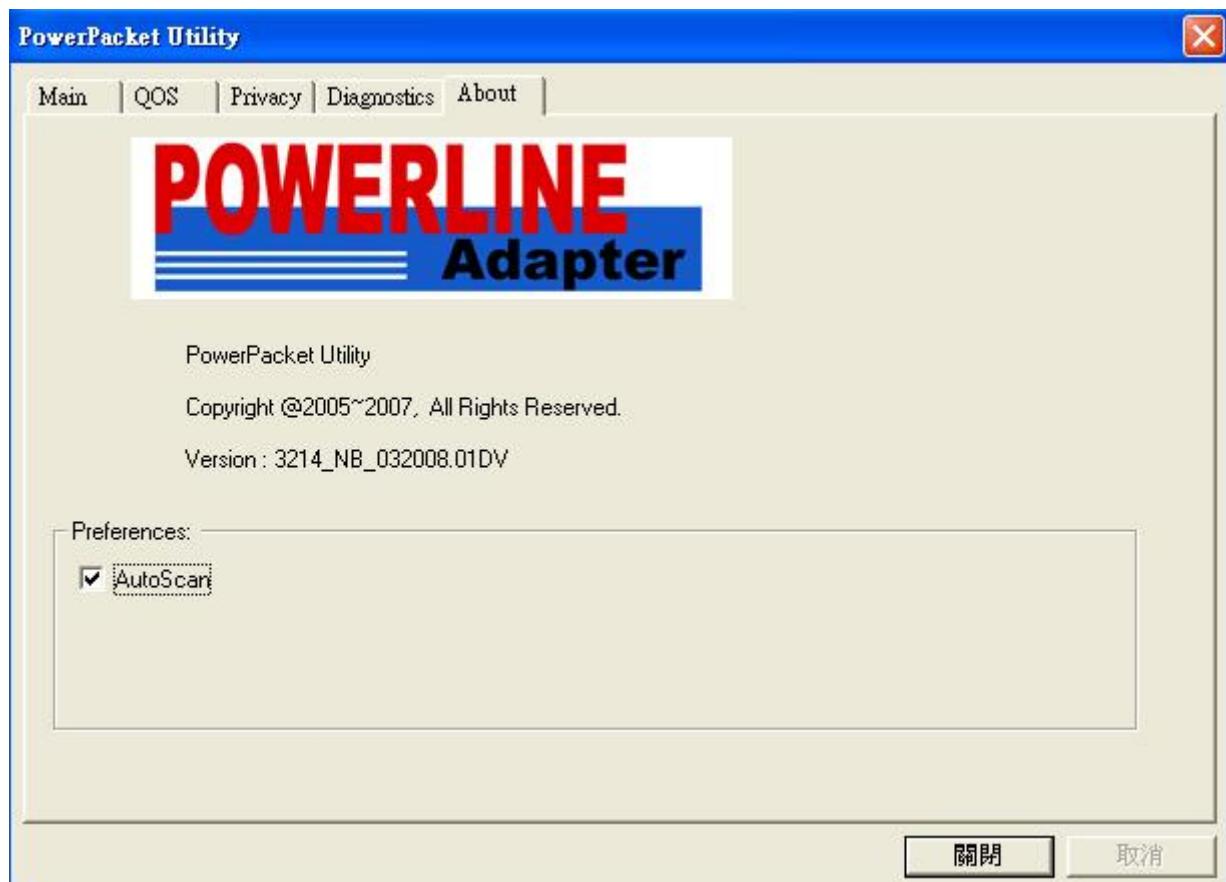
The **Lower Panel** contains a history of all remote Ethernet Powerline Adaptor devices seen on the computer over a certain period of time. All devices that were on the powerline network are listed here along with a few other parameters. Ethernet Powerline Adaptor devices that are active on the current logical network will show a transfer rate in the Rate column; devices on other networks, or devices that may no longer exist are shown with a “?” in the Rate column. The following remote Ethernet Powerline Adaptor devices information is available from the diagnostics screen:

- Device Alias Name
- Device MAC Address
- Device Password
- Device Last known rate
- Device Last Known Network name
- Date device last seen on the network

The diagnostics information displayed may be saved to a text file for later use, or can be printed for reference for a technical support call. Ethernet Powerline Adaptor devices, which are not part of the network anymore, can be deleted using the delete button. A dialog window pops up with a confirmation message if we try to delete a device whose password has been entered.

4.5 About

The **About** homepage show the Management Utility software version.



- AutoScan:** When enabled (Place a check), the Management Utility will automatically scan for Ethernet Powerline Adaptor devices on the local network every few seconds and updated the scanning information on the **Main** configuration homepage.

Advance Feature: How to Use the Push buttons

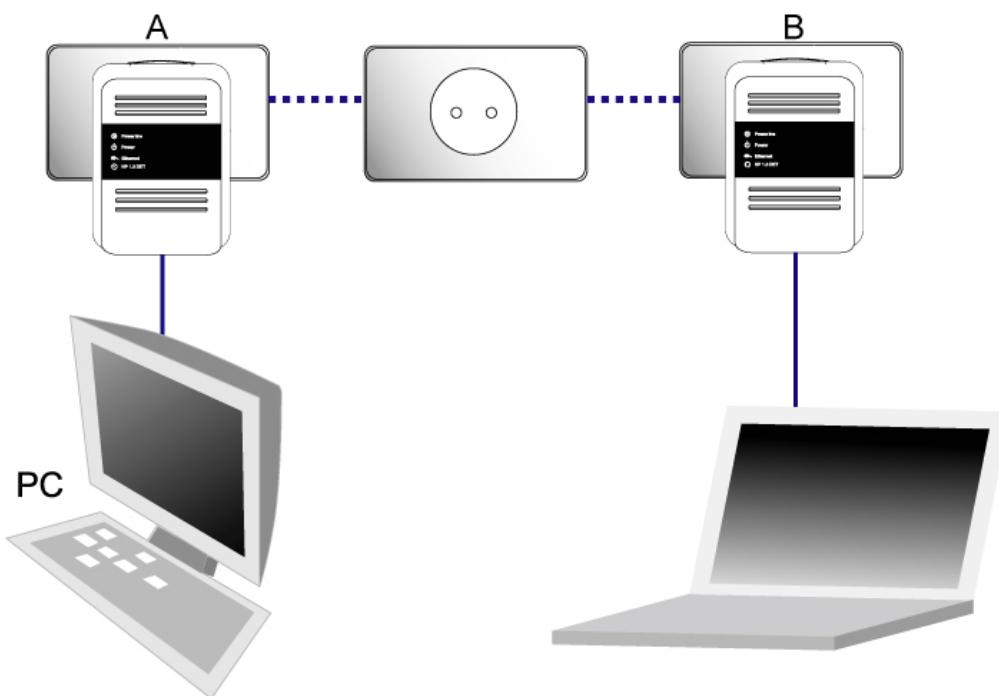
Pair(Secure with 128 bits-AES)

The Powerline AV standard uses 128-bit AES (Advanced Encryption Standard) to safely transmit data between powerline adapters. For the powerline adapters to communicate with each other they all need to use the same Network Membership Key (NMK). Otherwise, they cannot unscramble the encrypted data sent in the powerline network.

The **Pair** button allows you to set up a secure powerline connection with other HomePlug AV compliant powerline devices which also support the **Pair** feature.

Set Up a Powerline AV Network with the Pair button

You can connect a number of devices on a powerline network, but you can use the **Pair** button on only two devices at a time.



Create a Powerline network using the Pair button :

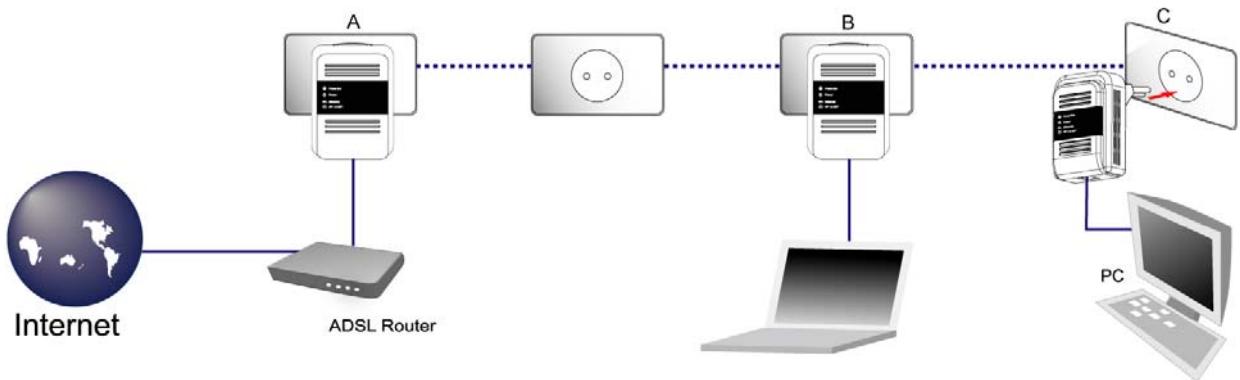
Step 1. Place a powerline adaptor A close to another powerline device B . After you set up the first powerline adaptor, you have 120 seconds to set up the second powerline device.

Step 2. Press the Pair button at one of your powerline adaptor A for more than 10 seconds until the Powerline light is off. This resets the network name to a random value and removes your device from any network it may belong to.

Step 3. Press the Pair button at the other of your powerline adaptor B you wish to connect for 2 seconds.
(This must be done within 120 seconds of pressing the Pair button on the first adaptor.)

Step 4. Wait for about 60 seconds while your powerline adaptors connect. The Powerline lights on both adaptors turn on when the connection is made.

Your Powerline AV network is now protected against unauthorized access.



Join an existing Powerline AV Network :

1. Press the Pair button on powerline adaptor C for more than 10 seconds until the Powerline light flashes.
2. Then repeat Steps 3 and Step 4 in this section using any powerline device (A or B) .

Pair Button Behavior

The following table summarizes the actions that occur when the Pair button is pressed for specific time.

Pair button Action	Status	Powerline Light Behavior
less than 3 seconds	The adaptor joins a network. It shares the same network name as other adaptors on the powerline network.	The Powerline light turns on if your adaptor is connected to another powerline adaptor or a powerline network.
more than 10 seconds	The adaptor leaves any network it is associated with and its network name assumes a random value.	The Powerline light turns off when it disconnects from the powerline network.

Reset

To reset the Powerline AV device,

1. Make sure the Power LED is on and not blinking.
2. Press and hold the Reset button for less than three seconds. Release the Reset button when the Power LED begins to blink. The default settings have been restored.

Appendix A: Troubleshooting Guide

The Troubleshooting Guide provides answers to common problems regarding the Ethernet Powerline Adaptor.

1. The Power LED does not light up.

Ans. Check the following:

1. Make sure that the Ethernet Powerline Adaptor is properly plugged into a power outlet.
2. Make sure the power outlet is active (working) by plugging another electric device into it.
3. Re-plug the Ethernet Powerline Adaptor to the power outlet again. If the Power LED still failed to light up, contact your local dealer for technical support.

2. The Ethernet LED does not light up.

Ans. Check the following:

1. Make sure that the Ethernet cable (RJ-45) is properly connected to the Ethernet Powerline Adaptor's Ethernet port.
2. Make sure that the other end of the Ethernet cable (RJ-45) is properly connected to the computer LAN card or to you Cable/xDSL Ethernet port.
3. Make sure your computer LAN card is properly installed and configured.
4. Make sure your Cable/xDSL broadband access is working and configured correctly.
5. Contact your local dealer for technical support if the Ethernet LED still failed to lights up after the above procedures.

3. Powerline LED does not light up.

Ans. Check the following:

1. Double click to enable the Management Utility and click the “Scan” tab under the **Main** configuration homepage. The Management Utility will automatically detect all other Ethernet Powerline Adaptor on your power line network.
2. Try to plug a second Ethernet Powerline Adaptor into a near by power outlet and check whether the Powerline LED lights up or not.
3. Contact your local dealer for technical support if the Powerline LED still failed to lights up after the above procedures.

Copyright

The contents of this publication may not be reproduced in any part or as a whole, stored, transcribed in an information retrieval system, translated into any language, or transmitted in any form or by any means, mechanical, magnetic, electronic, optical, photocopying, manual, or otherwise, without the prior written permission.

Trademarks

All product, company, brand names are trademarks or registered trademarks of their respective companies. They are used for identification purpose only. Specifications are subject to be changed without prior notice.